

# Biometry, ecology and population status of the Endangered Yellow-breasted Bunting *Emberiza aureola* in the Svyatoy Nos wetlands, Lake Baikal, eastern Siberia, Russia

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Yellow-breasted Buntings *Emberiza aureola* were common breeding summer visitors to the Svyatoy Nos wetlands in 1991–1994, but their numbers have declined sharply since then and the species was nearly extinct in this area by 2013–2014. Biometric data from 216 individuals are given. The birds leave their breeding grounds very early: adult males before 25 July and adult females and juveniles about one month later. Adult birds do not moult on the breeding grounds in the Svyatoy Nos wetlands. No causes for the collapse in the breeding population were apparent in the Svyatoy Nos wetlands.

## INTRODUCTION

The Yellow-breasted Bunting *Emberiza aureola* is a widespread species in the Palearctic Region that breeds from east Finland and west Russia, east to Kamchatka, south to north Ukraine, north Kazakhstan, Mongolia, north-east China, Sakhalin Island and north Japan, migrating to winter in South and South-East Asia and southern China (Dement'yev & Ptushenko 1940, Portenko & Stübs 1971, Chan 2004, BirdLife International 2016, Copete & Sharpe 2016). Its numbers are currently sharply decreasing and, although only first classified as Near Threatened in 2004, its status was uplifted to Endangered in 2013 (Durnev 2009, Yong *et al.* 2015, BirdLife International 2016). Here we present the results of our study of these buntings made in the Svyatoy Nos wetlands, Zabaykalskiy National Park, north-east Lake Baikal, eastern Siberia, Russia (approximately 53.55°N, 108.95°E), from 1991–2014.

JM and PS studied Yellow-breasted Buntings in the Svyatoy Nos wetlands in 1991, 1993, 1994, 2001 and 2005, and JM worked there alone in 2013 and 2014. Biometric data and data on seasonality were only collected in 1991, 1993 and 1994.

The grassy Svyatoy Nos wetlands, about 350 km<sup>2</sup> in area, cover most of the isthmus that links the Svyatoy Nos peninsula with the mainland. They are part of the ornithologically most important wetlands in the Lake Baikal region (Mlíkovský & Stýblo 1992, Mlíkovský *et al.* 2002, Mlíkovský 2009); a description of them is given by Mlíkovský *et al.* (1992).

Birds were trapped using mist-nets and the following biometric data were measured: body mass (using a Pesola spring scale to the nearest gram), wing and tail length to nearest mm (Töpfer & Heynen 2011), wing formula (distances of primaries P2–P8, numbered from the outside, and of the outermost secondary S1 from the wing tip, in mm (Mlíkovský 1978); P1 was always shorter than the greater wing-coverts). Fatness was scored on a six-degree scale (T0–T5) following Busse (1970).

## RESULTS AND DISCUSSION

### Biometry

Biometric data are shown in Table 1, and include the 1991 data previously listed by Stýblo & Mlíkovský (1992). Wing length, tail length and body mass agree with previously published data on Yellow-breasted Buntings measured in Russia (Timofeev-Resovskij 1940, Vinogradova *et al.* 1976, Glutz von Blotzheim & Bauer 1997). However, statistical comparisons were not possible, because these authors did not present the necessary statistical values.

Adult males are longer-winged and longer-tailed than both adult females and juveniles. Adult females do not differ from juveniles in wing length, but tend to have slightly longer tails (Table 2). Adult males are heavier than adult females and juveniles, but adult females do not differ from juveniles in this respect (Table 2).

The juvenile's body mass varied with body fatness. Fat score T0: body mass average: 18.1 ± 1.12 gm (n = 13, range = 16–20 gm); fat score T1: 19.4 ± 1.36 gm (n = 16, range = 17–21 gm); fat score T2 19.7 ± 1.37 gm (n = 6, range = 18–21 gm); and fat score T3: 21.0 gm (n = 2, range = 20–22 gm).

**Table 1.** Biometry of Yellow-breasted Buntings mist-netted in the Svyatoy Nos wetlands in 1991–1994. Body mass gm, all other data mm. P = primary (numbered from outside), S = secondary (outermost), n = number of specimens, SD = standard deviation. For statistical comparisons of mean values see Table 2.

	Adult males				Adult females				Juveniles			
	n	Mean	Range	SD	n	Mean	Range	SD	n	Mean	Range	SD
Mass	77	20.0	15–24	1.39	64	19.0	14–22	1.56	62	18.6	14–23	2.03
Wing	82	75.2	71–80	2.42	70	71.3	66–76	1.96	64	71.2	63–77	2.86
Tail	81	58.7	52–69	2.97	69	55.8	50–61	2.54	62	54.3	49–60	2.86
P2	63	1.0	0–3	0.69	52	1.0	0–3	0.68	64	1.8	0–4	0.80
P3	63	0.02	0–1	0.13	52	0.06	0–1	0.24	64	0.02	0–1	0.13
P4	63	0.1	0–1	0.30	51	0.16	0–1	0.37	64	0.06	0–2	0.30
P5	62	1.5	0–4	0.74	49	1.8	0–7	1.11	64	1.6	0–7	0.96
P6	59	7.5	5–10	0.96	51	6.9	5–10	1.16	64	6.4	5–11	1.05
P7	62	11.2	7–14	1.30	51	10.2	7–12	1.03	64	10.0	7–13	1.08
P8	63	13.5	11–17	1.36	51	12.5	10–15	1.15	63	12.4	9–15	1.26
S1	61	20.2	15–24	2.02	51	18.8	15–21	1.51	63	18.0	14–22	1.73

**Table 2.** Statistical comparison of mean body dimensions of Yellow-breasted Buntings (Table 1). t = t-test value (two-tailed), DF = degree of freedom, p = probability. Probabilities lower than 0.05 are highlighted in bold.

	Males – females			Males – juveniles			Females – juveniles		
	t	DF	P	t	DF	p	t	DF	p
Mass	4.397	139	<0.001	5.070	137	<0.001	1.177	124	0.242
Wing	10.693	150	<0.001	9.057	144	<0.001	0.231	132	0.818
Tail	6.527	148	<0.001	9.032	141	<0.001	3.130	129	0.002
P2	-0.543	113	0.588	-5.889	125	<0.001	-5.090	114	<0.001
P3	-1.215	113	0.227	0.011	125	0.991	1.232	114	0.220
P4	-0.992	112	0.323	0.617	125	0.538	1.512	113	0.133
P5	-1.266	109	0.208	-0.198	124	0.843	0.989	111	0.325
P6	2.672	108	0.009	5.713	121	<0.001	2.441	113	0.016
P7	4.207	111	<0.001	5.619	124	<0.001	1.265	113	0.208
P8	4.491	112	<0.001	4.969	124	<0.001	0.375	112	0.708
S1	4.071	110	<0.001	6.477	122	<0.001	2.560	112	0.012



**Plate 1.** Typical breeding habitat of Yellow-breasted Bunting *Emberiza aureola* in the Svyatoy Nos wetlands: more or less isolated shrubs, trees and groves at the edge of grassy (*Calamagrostis* and *Carex*) marshlands, 10 July 2013. This was the only site occupied by Yellow-breasted Buntings in southern Svyatoy Nos wetlands in 2013 and 2014.



**Plate 2.** An isolated grove in the marshland at the edge of the site shown in Plate 1, 10 July 2013. One pair of Yellow-breasted Buntings bred in this grove in 2013 but it was abandoned in 2014. The foggy hills in the background are the Svyatoy Nos range on the Svyatoy Nos Peninsula.

### Seasonal aspects

Yellow-breasted Buntings were already present in the Svyatoy Nos wetlands and males were singing when we arrived there on 24 June 1991 (Heyrovský *et al.* 1992), 6 June 1993 and 16 June 1994. In 1993 we found nests with eggs on 11 June, 16 June, 26 June, 8 July and 14 July (two) (M. Šálek *in litt.*, JM unpubl. data). The earliest record of young leaving their nest was on 7 July 1991 (Heyrovský *et al.* 1992), but a female carrying food was observed as late as 6 August 1991 (Heyrovský *et al.* 1992). Young Yellow-breasted Buntings are known to leave their nest still flightless and to spend the following two weeks or so in the same vicinity (Shkatulova 1962, Rymkevich 1976). We caught the first fully fledged juveniles in mist-nets on 14 July in 1991 and on 25 July in 1993 (we have no comparable data from 1994).

We did not observe post-breeding flocking of Yellow-breasted Buntings or any evidence of autumn migration; the birds simply disappeared from the wetlands. Our data indicate that the departure is sex- and age-dependent. In 1991 males were regularly mist-netted until 16 July, when the work was interrupted for a week. Thereafter, only two males were mist-netted (26 July and 2 August), although females and juveniles were regularly mist-netted until 28 August, when our field-work ceased. In 1993 males were regularly seen and mist-netted until 24 July (a single was also mist-netted on 11 August), whilst females and juveniles were regularly seen and mist-netted until 27 August (plus a single juvenile on 31 August). In 1994, when we studied birds in the wetlands from 11 August to 20 September, no males were mist-netted, whilst females and juveniles were regularly mist-netted until 22 August (plus single birds on 27, 29 and 30 August). In summary, these data indicate that the majority of males left the Svyatoy Nos wetlands before 25 July, probably immediately after the young fledged, whereas females and juveniles remained in the wetlands until late August and probably left their breeding grounds together.

The sex- and age-dependent departure from breeding grounds is also supported by Havlin & Yurlov (1977), who mist-netted only two adult males, one adult female and 39 juveniles between 5 and 31 August 1971 at Lake Chany (54.580°N 78.140°E), where Yellow-breasted Buntings were common breeding birds.

Neither adult males nor adult females moult in the Svyatoy Nos wetlands, which concurs with previous data from mainland Yellow-breasted Buntings of the nominate subspecies (Stresemann & Stresemann 1969, Rymkevich 1983, 1990, Chernyshov 1991). Note that adults of the eastern subspecies, *Emberiza aureola ornata*, moult before autumnal migration (Stresemann & Stresemann 1969). We recorded no fattening of adult males before their

departure from the wetlands. Most adult females also showed no fat (fat score T0), although traces of fat were visible around the furculum of some adult females mist-netted during the second half of August: fat score T0 (3), T1 (3). However, most juveniles already had fat visible in the region of the furculum and on the belly in the second half of August: fat score T0 (4), T1 (10), T2 (5), T3 (2).

### Population status

Yellow-breasted Buntings were by far the commonest songbirds of the Svyatoy Nos wetlands from 1991–1994 (Heyrovský *et al.* 1992, Stýblo & Mlíkovský 1992, and our unpublished data). They were also known to be very common in suitable habitats around southern Lake Baikal (Fefelov *et al.* 2001) and in the wider vicinity of Lake Baikal during the 1980s and 1990s (Bogorodskiy 1989, Goroshko 2013). We did not estimate the overall population size during the 1990s, but noted where the birds occurred, estimated local densities and listed all birds trapped during mist-netting. From these data we estimate the overall population of Yellow-breasted Buntings in the southern part of the Svyatoy Nos wetlands (i.e. south of Lake Arangatur) very roughly to have been some 500–1,000 breeding pairs at that time. Our visits to the Svyatoy Nos wetlands were brief in 2001 and 2005, but Yellow-breasted Buntings were still widespread there in that period.

However, in 2013 we found Yellow-breasted Buntings at only two sites in the southern part of the wetlands: at least four pairs (upper limits were not estimated) were breeding at 53.530°N 108.960°E, and a single pair was breeding at 53.56°N 108.94°E, with adults observed carrying food at both sites. In 2014 our specific search for Yellow-breasted Buntings covered the whole of the southern part of the Svyatoy Nos wetlands, but we only found the species at the 53.530°N 108.960°E site, where seven singing males were recorded in early July. Although suitable habitat was apparently widespread in 2014, all seven of the males were singing on a single site. No females were seen in 2014; they were presumably incubating eggs during our study period, but it remains unclear whether all the singing males were paired or whether any were single.

A comparison of the data from the early 1990s and the early 2010s shows that the local breeding population of Yellow-breasted Buntings decreased by some 99%. Our anecdotal evidence from 2001 and 2005 suggests that much of the decline in the Svyatoy Nos area occurred in the decade between 2001 and 2014. At Davsha, about 100 km north of our study site, a major decline of locally breeding Yellow-breasted Buntings was recorded in 2000–2001 (Ananin 2015). The few remaining pairs in the Svyatoy Nos wetlands clearly do not constitute a self-sustaining population and



the species was nearly extinct here in 2014. This collapse corresponds with many recent observations from other parts of its breeding range, including eastern Europe (Romanov 2003, Zav'yalov *et al.* 2011a, b, Khokhlova & Artem'yev 2012, 2015, Ivanchev *et al.* 2013, Valuev 2013), Siberia (Popov & Maleev 2008, Durnev 2009, Ananin 2010, Ryabtsev 2011, 2013, Goroshko 2013, Ananin 2015) and Japan (Tamada 2006, Tamada *et al.* 2014).

The reasons for the sharp decline of Yellow-breasted Bunting populations in the Svyatoy Nos wetlands do not appear to be related to conditions on the breeding grounds. Plenty of apparently suitable habitat was available there in both the 1990s and the 2010s, and we found no apparent differences in the potential food supply between the two periods, which makes food shortage an improbable explanation. Yellow-breasted Buntings were neither hunted nor suffered other anthropogenic disturbance in the Svyatoy Nos wetlands in either study period. Thus, their population almost certainly declined due to problems away from their breeding grounds, i.e. on migration and/or in their wintering areas, where human pressure, especially but not exclusively overhunting, may be the main cause of population decline (Ryabtsev 2011, Kamp *et al.* 2015, Yong *et al.* 2015, Copete & Sharpe 2016, Jiao *et al.* 2016).

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